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TABLE OF CONTENTS

Page

FEATURE

Norman McKillop Ridgway 1

NEWS EVENTS

Earthquake Damaged Eastern U.S.A. 7

New Caledonia Earthquake 7

Strong Earthquake Shook East Bay Area of San Francisco 7

Ruiz Volcano, Colombia 7

INTERNATIONAL TSUNAMI INFORMATION CENTER

Director, ITIC Participates in Tsunami Exercise 7

Director, ITIC Presents Paper at PACON '86 8

ITIC Director Lectures to Students 8

Intersessional Meeting with IOC Senior Assistant Secretary in Honolulu, Hawaii 8

Russian Scientist Visits ITIC 9

ITIC Visitors 9

IOC-ITSU

Australia is Member of ITSU 9

Committee on Climatic Changes and the Ocean 10

19 Session of the Executive Council Held 6-12 March 1986, Paris, France 10

PACON '86 Held in Honolulu, Hawaii 10

List of National Contacts of ICG/ITSU 11

NATIONAL & AREA REPORT

Honolulu's Pier 4 Tide Gauge Oldest in the World 15

Tsunami Station Inspection 15

British Columbia's Tsunami Warning Exercise: Exercise Goldfish . 16

New Information from the Soviet Union for Communication Plan . . 16

ANNOUNCEMENTS

The Law of the Sea 16

Hawaii Symposium on How Volcanoes Work 17

PTC '87: 18-27 January 1987 17

Coastal Zone '87 Call for Papers 18

Tsunami Symposium, August-September 1987, Canada 18

Geografia de Chile (Geography of Chile) Published 19

PTC '86 Proceedings Published 19

Soviet-Japanese Symposium held in Khabarovsk Last October 19

Summary of Publications from IOC. 20

Proceedings of the International Tsunami Symposium 1985 21

ABSTRACTS

Approximate Relationship of Intensity to Magnitude and Hypocentral Distance for Hawaiian Earthquakes 21

The Lanai Earthquake of February 1871 22

Earthquakes, Volcanoes and Tsunamis: An Anatomy of Hazards . . . 22

PACIFIC TSUNAMI WARNING CENTER

Joe Zebro Retires from PTWC 23

GEOSCOPE Instrumentation to be Installed at PTWC 24

Seismic Summary 24

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TSUNAMI NEWSLETTER is published by the International Tsunami Information Center to bring news and information to scientists, engineers, educators, community protection agencies and governments throughout the world.

We welcome contributions from our readers.

The International Tsunami Information Center (ITIC) is maintained by the U.S. National Oceanic and Atmospheric Administration (NOAA) for the Intergovernmental Oceanographic Commission (IOC). The Center's mission is to mitigate the effects of tsunamis throughout the Pacific.

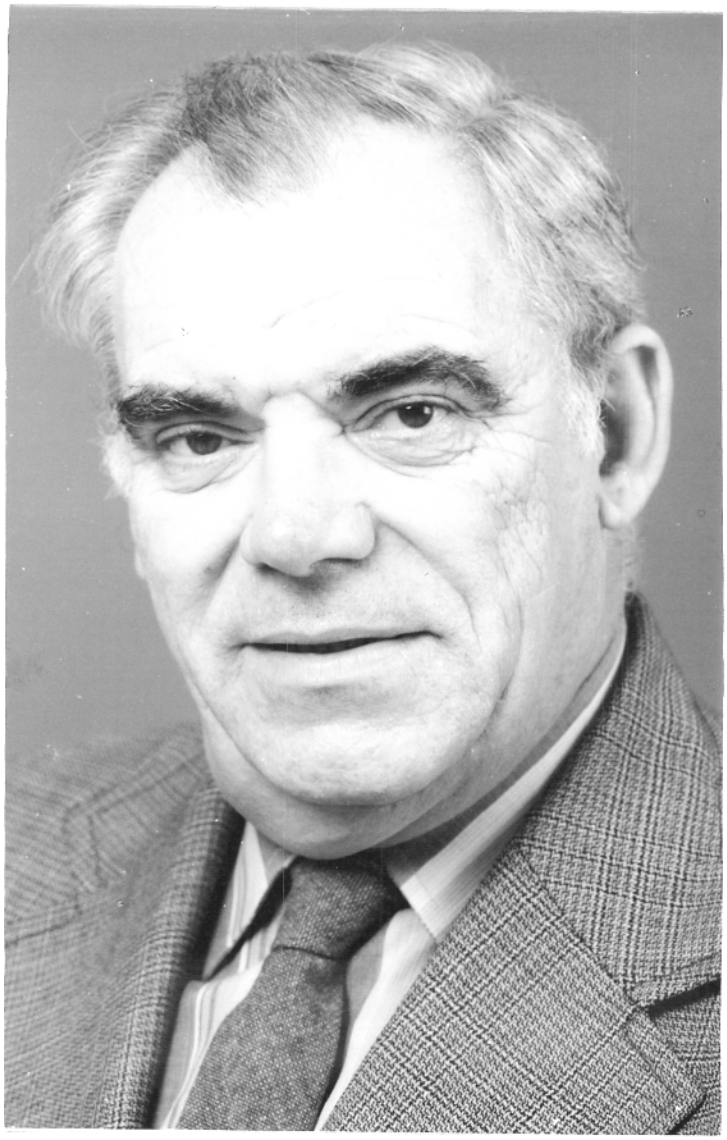
MEMBER STATES

Present membership of the IOC International Coordination Group for the Tsunami Warning System in the Pacific (ITSU) comprises of the following States:

AUSTRALIA
CANADA
CHILE
CHINA
COLOMBIA
COOK ISLANDS
ECUADOR
FIJI
FRANCE
GUATEMALA
INDONESIA
JAPAN
KOREA (REPUBLIC OF)
MEXICO
NEW ZEALAND
PERU
PHILIPPINES
SINGAPORE
THAILAND
UNITED KINGDOM (HONG KONG)
USA
USSR
WESTERN SAMOA

FEATURE

Norman McKillop Ridgway
by Basil R. Stanton
Department of Scientific and Industrial Research (DSIR)



Norman Ridgway passed away in his bed at home on 16 February 1986. He is survived by his wife Olwen and daughter Jane.

Norman McKillop Ridgway was born in Scunthorpe, England on 29 October 1924. He obtained the Oxford School Certificate in 1940 and commenced work as a technician in Lysaght's Steelworks Laboratory in Scunthorpe. He served in the Royal Navy from 1942-6 as a Petty Officer Radio Mechanic. In 1946-7 he worked as a school teacher preparatory to spending 3 years in Training College and gaining a Ministry of Education Teaching Certificate. From 1949-51 he taught science at the secondary level.

Coming to New Zealand in 1951 he worked with Vacuum Oil Company in their Technical Advisory Service until 1953 when he joined the staff of the Oceanographic Observatory (DSIR) as it was then.

In the 1950's and 60's Norman was involved in the extensive regional oceanographic surveys in New Zealand waters which defined the characteristics of ocean and coastal waters in this area and their

interpretation in terms of ocean circulation. This work required extensive sea-going often in less than ideal conditions. Norman was involved in all aspects of this work from data collection through analysis to final reporting.

At this time, Norman was involved in small scale nearshore current and dispersion surveys. These were often in relation to proposed effluent outfalls and similar engineering works. He was often involved as an expert witness for DSIR at various planning hearings. This work led him naturally into the field of cooling water ocean outfalls when these were first proposed in the late 1960's. He was particularly associated with the investigations for the New Plymouth Thermal Power Station. In January 1974 he travelled to Australia to study environmental aspects of thermal power station cooling water systems.

Norman was an early user of remote sensing from an aircraft, and did much work on aerial dye tracking for water movements and infra-red surface temperature surveys.

Norman visited the Antartic in 1962 on a scientific project and was appointed Station Leader at Cape Hallet for a year in 1963-4. He was unfortunate to lose all his possessions in a fire at Cape Hallet and was hospitalized for a period as a result.

From 1966 Norman was involved as a member of the Tsunami Advisory Panel in evaluating tsunami warnings in terms of their likely effect on New Zealand. In 1977 he was invited to visit the International Tsunami Warning Center in Honolulu, Hawaii for a 6 week period as part of their Visiting Scientist Program. This program provides for individual scientists to visit the Center for purposes of co-operative research and training in the cooperation of the International Tsunami Warning Systems in the Pacific. In 1978 he was appointed Associated Director of the International Tsunami Information Center (ITIC), Hawaii. This appointment was initially for 1 year but was extended for a further 6 months in 1979.

In April 1982 Norman attended the 8th Session of the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) in Suva, Fiji. These meetings are held biennially under the auspices of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. Previously New Zealand did not take an active part in these meetings apart from one held in Wellington in 1974. At the 8th Session of ICG/ITSU Norman was rapporteur and took an active part in the discussions particularly those relating to the formation of a regional tsunami warning system in the South West Pacific.

At the 9th Session of ICG/ITSU in Honolulu, in March 1984, Norman Ridgway was elected Chairman of the Group, a position he still held at the time of his death. In this role he was actively involved in the

10th session of ICG/ITSU held at the Institute of Oceanographic Sciences, Sidney, British Columbia, Canada, in August 1985. This meeting was held in conjunction with the Workshop on the Technical Aspects of Tsunami Analyses, Predictions and Communications.

In December 1984, Norman undertook a mission to Colombia to investigate and advise on the measures necessary to develop a tsunami warning system for Colombia.

While Norman's time in recent years has been very much taken up with his tsunami work, he was still able to take part in a full range of Oceanographic Institute projects. He was particularly involved in the Coastal Climate Survey whereby long term measurements of temperature and salinity at a number of coastal stations are being collected. At the time of his death he was analyzing this data and was particularly interested in the long period changes in ocean climate.

Eulogy
Given at Norman Ridgway's Funeral on 20 February 1986
by Dr. Ron Heath
Director Designate of New Zealand Oceanographic Institute

As everyone who knew Norm Ridgway knows, it is impossible to do justice to his qualities - these qualities can only be fully appreciated by having spent time with him. As seagoing oceanographers we were fortunate to have had this opportunity.

Norman McKillop Ridgway was born in Scunthorpe, England, on 29 October 1924. He served on an aircraft carrier during the later part of the Second World War and later trained as a teacher, graduating in 1949. He came to New Zealand, and married Olwen Aked. A daughter, Jane, was born in 1960, and last year Jane and Graeme had a daughter, Megan.

The formal facts I have given say nothing about Norm Ridgway, the man that we all had the utmost respect for. Norm joined DSIR in 1953 and after a break of a year with Moss Bros returned to DSIR in 1956.

A measure of his dedication in those early days is the saga of a small ship sailing east from Auckland to Great Barrier Island. Norm and a colleague acted as engineer and captain while the officers and crew recovered from a visit to an Auckland hotel. Norm had a year in the Antarctic. Excitement followed him. He had the experience of seeing his belongings burned in a fire at Cape Hallett and being chased across the pack ice by a killer whale.

Norm was a physical oceanographer with an expertise in the study of New Zealand coastal waters. This was the overriding theme of his research, his latest scientific paper looks at the impact of the regular change in the Pacific climate on the New Zealand coastal waters.

He made a major contribution to New Zealand marine science, not only through his scientific papers but also by the endless help and advice he most willingly gave others. He was particularly generous with his time and encouragement in assisting younger scientists and technicians, shape their careers.

Over the past 5 years his vast experience was recognized with involvement in the Pacific Tsunami Warning System. This included a period of nearly 2 years in Hawaii and for the last two years Norm served as Chairman of this international committee. Such was the respect that the international community had for this scientist and his abiilities.

Norm was probably the most compassionate man I have know. That was the true essence of the man. Within the New Zealand Oceanographic Institute there would not be a person whom he had not steered in the correct direction. In reality, he has been the unofficial personnel officer within the Institute over the past 30 years.

Norm was an avid sportsman. In his early days a sprinter and pacey rugby wig three-quarter, and later a rubgy coach. In summer his mind turned to cricket as a stalwart of the Karori Cricket Club and coach/captain of the social Oceanographic side.

I say again, it is impossible to do justice to Norm's qualities. All our lives have been influenced by Norm and we are the richer for it. It will not be the same without him.

In Memoriam -- Norman Ridgway
by George Pararas-Carayannis

It was a great shock to learn of the premature death of my friend Norman Ridgway, Chairman of the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU)--our Group. Norman's death is a major setback for our tsunami program for which he had worked so diligently in the last twenty years. Norman enjoyed great esteem from all his colleagues all over the world and our program lost a good scientist. But more than that, our small international scientific community has lost a good and supportive friend.

Norman's career and achievements have been covered very nicely by his friend and colleague in New Zealand, Mr. Basil R. Stanton in his article and the eulogy by Dr. Ron Heath, Director Designate of New Zealand Oceanographic Institute. I just want to add my own personal comments and experiences of what began as a professional association with Norman and culminated into a warm and lasting friendship.

Norman was first nominated for a visit to ITIC as early as 1975 by Dr. J. W. Brodie, then Director of the New Zealand Oceanographic Institute. However, commitments for other visiting scientists had been made and it was not until the summer of 1977 when Norman was selected to our visiting scientists program for six weeks in Honolulu, under the sponsorship of the Intergovernmental Oceanographic Commission. Obviously it was a very good selection and as a result of Norman's visit to ITIC, we greatly improved our cooperation, established better communications for the Tsunami Warning System, and developed a better program for tsunami preparedness for New Zealand. During Norman's initial six week stay in Honolulu I developed a great deal of respect for him and his qualities as a scientist. I was very sorry to see him go, but before he left, I informed him of the pending vacancy in the position of Associate Director of ITIC and I urged him to see if his government would nominate him for this post. During this time I wrote to Dr. E. W. Dawson, then acting Director of New Zealand Oceanographic Institute to consider Norman's nomination. I also made a recommendation to the Secretary of IOC for consideration of Norman's candidacy if and when it came.

After my recommendation was received by the IOC Secretariat, and during a subsequent Executive Council meeting of IOC in Paris, the New Zealand delegation nominated Norman as ITIC's Associate Director for a period of one year. I was gratified to learn of his nomination and I started looking for appropriate housing in Honolulu for Norman, his wife Olwen, and daughter, Jane. Norman returned to Honolulu and served as Associated Director from 1978 to 1979. During that time I had the pleasure of meeting Norman's family.

A great deal of good work was accomplished during Norman's tenure at ITIC which was beneficial for ITSU and for New Zealand. New Zealand had been a member of ITSU for a number of years and Norman, prior to his tenure at ITIC, had been involved for some years with the evaluation and participation of his country in the Tsunami Warning System. However, there had been very little direct operational experience of the system, so Norman's involvement resulted in much better understanding of the working of the Tsunami Warning System, and an improved program of preparedness for New Zealand.

During this interval we worked on historical earthquakes and tsunamis that have affected New Zealand, and identified areas along New Zealand's coastline which are susceptible to tsunami damage and flooding. Also Norman provided tremendous help in the administration

of ITIC. His support was truly inspirational and helped greatly in building a good program for ITIC and for an improved service to the Member states of the Tsunami Warning System and ITSU. A number of new initiatives were started, organized and acted upon. His overall dedication and enthusiasm for our program made our work a great deal easier.

When the term of his tenure expired, we requested New Zealand for an extension of six more months, which was granted and the good work was continued, carrying out also an important mission to Australia. Norman returned to New Zealand in the summer of 1979 and the excellent work carried out by him during his tenure as Associate Director of ITIC was praised by myself, the Secretary of IOC, (then Mr. Desmond P. D. Scott) and the Chairman of IOC (then Dr. A. Ayala-Castanares) in letters to the new Director of the New Zealand Oceanographic Institute, Dr. D. E. Hurley. But even after returning to New Zealand, Norman continued his association with our program completing an atlas of tide gauges in the Pacific which was published by IOC. He was also designated as New Zealand's national contact for ITSU and as delegate to the ITSU meetings. It was during the ninth session of ITSU in 1984 in Honolulu that Norman was elected as Chairman of the Group.

For the next two years Norman served very effectively as Chairman, and handled expertly the Chairmanship of the Tenth Session of ITSU in Sidney, Canada in the summer of 1985. After the meeting Norman continued his work on the action items resulting from ITSU X and had been invited to come to Honolulu in March of 1986 to have an intersessional coordination meeting with Dr. Oliounine, Mr. Dick Hagemeyer, Mr. G. Burton, myself and others to discuss ITSU matters and to review with our Russian colleagues the tsunami travel time charts. Unfortunately his premature death prevented Norman from participating at this meeting. Dr. Oliounine showed me Norman's telex, two days prior to his death in which he had concurred to come to Hawaii for the conference.

In conclusion, I will always remember Norman for his quiet, gentlemanly manner, for his good sense of humour, for his willingness to help his colleagues, and for his good and honest friendship. On behalf of IOC, the staff of ITIC, the ICG/ITSU Group and myself, I like to extend to Norman's wife, Olwen, and his daughter Jane our most heartfelt and sincere sympathy.

We are all mourning with Olwen and Jane for their great loss, which is also our loss.

NEWS EVENTS

Earthquake Damaged Eastern U.S.A.

A 31 January 1986 earthquake, measuring 5.0 on the Richter scale, shook 11 states from Wisconsin to Maryland, the District of Columbia, and parts of Ontario, Canada. Damage occurred at the epicenter, injuring 13 persons.

New Caledonia Earthquake

A 6.5 magnitude earthquake rumbled through the Loyalty Islands in New Caledonia, but caused no damages or casualties on 15 January 1986.

Strong Earthquake Shook East Bay Area of San Francisco

An earthquake measuring 4.0 on the Richter scale hit Northern California 29 March 1986. Three tremblors followed. The third tremblor, estimated at 5.3 on the Richter scale by the University of California Seismographic Station at Berkeley, struck Northern California two days later.

The following has been extracted from an article on volcanic events that appeared in the SEAN Bulletin of the Smithsonian Institute:

Ruiz Volcano, Colombia

Colombian geologists reported that microseismic activity diminished between mid-February and mid-March and seismic events of mixed frequency also diminished.

Additional seismic information comes from Jim Zoll: After the 13 November eruption, a 6-station telemetry network was installed around the volcano. Seismic activity was moderate in November and December, consisting chiefly of high-frequency earthquakes with magnitudes to 3.5. About 1300 earthquakes were counted in December. In January, activity was considerably lower.

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Director ITIC Participates in Tsunami Exercise

On 29 January 1986 a no-notice tsunami exercise was held in the State of Hawaii by the State's Civil Defense Agency. Dr. George Pararas-Carayannis, Director of ITIC, in his additional capacity as State of Hawaii Tsunami Advisor, participated in this exercise and assisted the Civil Defense Agency with technical advice.

The objective of the exercise on a no-notice basis was to test as realistically as practicable, Federal, State and County civil defense procedures as they pertain to the preparedness and response phases of a simulated tsunami event that posed a threat to the State of Hawaii.

On 18 March 1986, Dr. Pararas-Carayannis participated in a critique and evaluation of the exercises which resulted in a number of recommendations for tsunami preparedness and improvements in response. The experience gained from these exercises is being documented by Dr. Pararas-Carayannis to be included in a "Guide for Tsunami Exercises," presently under preparation and for eventual distribution to ITSU Member States.

Director, ITIC Presents Paper at PACON '86

The Director of ITIC, Dr. George Pararas-Carayannis presented a paper entitled, "The Mexican Earhtquakes and Tsunami of 19 and 21 September 1985" at the Pacific Congress on Marine Technology (PACON '86) held in Honolulu, Hawaii on 24-28 March 1986. A total of six presentations were made in the tsunami section of this conference sponsored by the Marine Technology Society and many other organizations, including ITIC.

ITIC Director Lectures to Students

At the invitation of the Military Affairs Council, Dr. George Pararas-Carayannis was invited to participate in an enrichment educational program in Hawaii that benefits children of military personnel and of local residents.

This pilot program is a joint effort between private business and the Department of Education of the State of Hawaii. The enrichment program was designed to provide acculturation and enrichment activities for academically talented students using science and Hawaiian studies as the subject areas. Dr. Pararas-Carayannis gave two lectures on 19 March 1986 to two different groups. Representatives of the Department of Education Administration attended one of his lectures and assessed the program as very worthwhile pledging continuous support.

Intersessional Meeting with IOC Senior Assistant Secretary in Honolulu, Hawaii

Dr. Iouri Oliounine, IOC Senior Assistant Secretary visited Honolulu on 27-29 March 1986 to meet with Dr. Pararas-Carayannis, Director ITIC, Mr. Richard Hagemeyer, National contact USA, Mr. Gordon Burton, Director Pacific Tsunami Warning Center, Dr. T. S. Murty, Chairman IUGG Tsunami Commission and others. This was an intersessional meeting to review action items resulting from ITSU X and for preparation for ITSU XI.

Dr. Vladimir Shaidurov of the Academy of Sciences, Chief of Computing Center, Krasnoyarsk, U.S.S.R. also participated in a meeting to discuss the results on tsunami travel time charts, presently under preparation at U.S.S.R.

Russian Scientist Visits ITIC

Dr. Vladimir Shaidurov, Chief of Computing Center at the Academy of Sciences in Krasnoyarsk, U.S.S.R., visited ITIC 27-29 March 1986 for the purpose of presenting the results of work completed in U.S.S.R. on tsunami travel time charts. Dr. Shaidurov explained the algorithms used in the numerical modelling of tsunami travel times and received input from the participants.

ITIC Visitors

Mickey K. Moss	Assistant Chief, Pacific Operations Group
Pat Southern	Community Ed. Coordinator, YMCA
Joe & Lucia Patrucco	President, Continental Lodge
Ed Bellingsley	Field Services Engineer
Kennedy Smyth	Hydrolic Engineer, Govt. of British Colombia
Kurt Carlson	Customer Engineer, Wang Laboratories
Vladimir Shaidurov	Chief, Laboratory of Computing Center of USSR
Iouri Oliounine	Assistant Secretary, IOC, Paris, France
Gerry Dohler	Ex-Associate Director, ITIC; Ex-Chairman, ICG/ITSU
Eddie Bernard	Director, Pacific Marine Environmental Lab, Seattle, Washington
Don L. Olson	National Weather Service, Seattle, WA

IOC—ITSU

Australia is Member of ITSU

On 1 January 1986 Australia became a member of the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU). Australia is the 23rd country to join the Group. Mr. P. F. Noar of the Bureau of Meteorology was designated as the National Contact. His address is the following:

Mr. P. F. Noar
Assistant Director (Services)
Bureau of Meteorology
GPO Box 1289 K
Melbourne, Victoria 3001
Australia

Committee on Climatic Changes and the Ocean

The Seventh session of the Committee on Climatic Changes and the Ocean took place in Paris, France, on 14-21 January 1986. A Summary Report has been published by the Intergovernmental Oceanographic Commission. The Seventh Session covered a number of topics related to current ongoing international cooperation on global oceanic and atmospheric data collection and research.

19 Session of the Executive Council Held 6-12 March 1986, Paris

The Session covered the following proposals:

The Draft Implementation Plan for the Global Sea-Level Observing System

The Co-Sponsorship with WMO of a Drifting-Buoy Co-operation Panel

The Structure and Responsibilities of the Subsidiary Bodies of the Commission

Measures to Enhance the Role and Efficiency of the Commission in the Long Term to Meet the Needs of Member States and the World Community

PACON '86 Held in Honolulu, Hawaii

The second Pacific Congress on Marine Technology was held 24-28 March 1986. The 149 papers and 35 exhibitors contributed to the theme, "EEZ Mapping and Ocean Resources of the Pacific." The conference was organized into two major sessions:

OCEAN SCIENCES & TECHNOLOGY

- Undersea Vehicles & Ocean Robotics
- Remote Sensing & Oceanographic Satellites
- GPS-Positioning & Navigation (Update)
- Oceanic Acoustics
- Pacific Hydrography, Bathymetry & EEZ Mapping
- Offshore Engineering
- Buoy Technology & Oceanographic Instrumentation
- Tsunami
- Marine Science & Technology
- The Hawaiian Ocean Experiment (HOE)

MARINE RESOURCES MANAGEMENT

Marine Technology for Medium & Small Scale Fisheries
Ocean Energy
Marine Mining
Aggregation Devices
Marine Economics & Planning
Marine Transportation & Ports
Marine Education
Marine Cities
Marine Recreation
Ecotechnologies in Aquaculture
Pacific Outer Continental Shelves (EEZ)
Marine Biotechnology

The following tsunami papers were presented:

An Observational Network for Tsunami Research. E.N. Bernard

Tsunami Travel Time Charts: A Critical Look at the Ocean Depth Data. T.S. Murty

Possible Tsunami Effects in Hawaii and West Coast of North America from a Predicted Large Earthquake in the Aleutian Islands. T.S. Murty and N.K. Saxena

Database of Tsunamigenic Earthquake in China. Q. Zhou and W.M. Adams

Design and Development of a Coastal Tsunami Gage. G.D. Curtis

The Mexican Earthquakes and Tsunami of 19 and 21 September 1985. G. Pararas-Carayannis

The Proceedings is published and available at ITIC for review.

List of National Contacts of ICG/ITSU

The following is a list of National Contacts of ITSU members on file in the ITIC office. Please inform ITIC if there are any changes.

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KOREA (REPUBLIC OF)	Mr. Myong Bok An Director of Weather Forecasting Korean Meteorological Service 1 Songweol-dong, Chongro-ku Seoul, 110 Korea
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PERÚ	Contralmirante Jorge A. del Aguila Sanchez Direccion de Hidrografia y Navegacion de la Marina Casilla Postal No. 80 Gamarra No. 500 Chucuito, Callao, Peru

PHILIPPINES	Mr. Conrado M. Santos Chief Geophysicist Physical Science Division Bureau of Coast & Geodetic Survey 421 Barraca St. San Nicolas, Manila, Philippines
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Chairman, ICG/ITSU Ing. Eddy H. Sanchez Benett
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NATIONAL & AREA REPORT

Honolulu's Pier 4 Tide Gauge Oldest in the World

The National Ocean Service (NOS) has been operating an automatic tide recording gauge at Honolulu's Pier 4 since the year 1880 making it one of the oldest locations providing a continuous historical sea level records in the world.

Presently, NOS is developing a new generation tide/tsunami water level recorder and has recently received several prototypes for field testing. The Pier 4 site has been selected as one of the test sites for this recorder for two reasons. First, accessibility for the National Weather Service's Tsunami Warning System personnel; secondly, exposure to a tropical marine environment.

After the recorder is installed, NOS would like to make this tide/tsunami site a "showcase" for visiting tsunami scientists who frequently ask to visit an operational United States tide/tsunami recording station. The site is across the street from where ITIC is located, thus making it easily accessible to all ITIC visitors interested in state-of-the-art sea level monitoring instrumentation.

Tsunami Station Inspection

The Pacific Tide Party personnel completed the annual inspection of the following stations:

Honolulu, Hawaii	27 January - 1 February 1986
Johnston Island	18-22 February 1986
Nawiliwili, Hawaii	3-6 February 1986
Kahului, Hawaii	6-8 February 1986
Hilo, Hawaii	9-11 February 1986
Midway Island	13-20 February 1986
Pago Pago, American Samoa	21-26 February 1986
Wake Island	26-28 February 1986
Kwajalein	1-4 March 1986
Truk Atoll (Moen Island)	2-5 March 1986
Guam	5-14 March 1986

British Columbia's Tsunami Warning Exercise: Exercise Goldfish

After the meeting of the North West Emergency Officials last October, the States of Alaska and Washington as well as Oregon and California were interested in joining British Columbia in their 1986 Tsunami Warning Exercise called "Exercise Goldfish". Region X of the Federal Emergency Management Agency (FEMA) will coordinate U.S. participation, including ATWC and EPC will coordinate Canadian participation.

New Information from the Soviet Union to be included in the Communication Plan

The Soviet Union has given new information about their tsunami warning service. The Soviet Union has three regional tsunami warning centers: Yuzhno-Sakhalinsk, Petropavlovsk-Kamchatskiy and Vladivostok, all are within city limits. Their system also includes three seismic stations: Petropavlovsk-Kamchatskiy ($53^{o}01N$ $158^{o}39E$), Yuzhno-Sakhalinsk ($47^{o}01N$ $142^{o}43E$) and Kurilsk ($45^{o}15N$ $147^{o}53E$).

The new information will be included in the draft of the Master Plan along with the following sea-level stations which can be used for the operational purposes of the International Tsunami Warning System in the Pacific:

Bering Island	$55^{o}12$ N	$165^{o}59$ E
Severo-Kurilsk	$50^{o}40$	$156^{o}07$
Matua Island	$48^{o}03$	$153^{o}15$
Yuzhno-Kurilsk	$44^{o}011$	$145^{o}49$
Nachodka	$42^{o}48$	$132^{o}54$

ANNOUNCEMENTS

The Law of the Sea

The Law of the Sea Institute of the University of Hawaii and the University of Miami, School of Law will co-sponsor the 20th Annual Conference of the Law of the Sea Institute. The meeting will take place at the Sheraton Bal Harbor Hotel, in Miami, Florida on 21-24 July 1986. The theme of the Conference is entitled: "The Law of the Sea: What Lies Ahead?" For registration details write to:

The Law of the Sea Institute
University of Hawaii
William S. Richardson School of Law
2515 Dole Street
Honolulu, HI 96822
USA

Hawaii Symposium on How Volcanoes Work

The Symposium will convene on 19-25 January 1987. This meeting, marking the diamond jubilee of the Hawaiian Volcano Observatory, will include formal paper presentations as well as field trips to volcanoes on the Big Island. In addition, the Hawaii Institute of Geophysics will lead reconnaissance hikes to the other Hawaiian islands before and after the meeting. The main emphasis of the meeting will be on conceptual models of how volcanoes work. Other topic will include internal and deep structure of volcanoes, dynamics of magma chambers, dynamics of intrusion and eruption processes, exploration of submarine volcanoes, earthquakes and tremors related to volcanism, monitoring active volcanoes, forecasting volcanic eruptions, assessing volcanic hazards, and reducing volcanic risk.

Attendance will be limited to the first 500 registrants. The formal call for papers and registration announcement will be mailed in April, 1986; persons interested in receiving those materials should contact:

Lois Elms
Western Experience
2369 Carriage Circle
Oceanside, CA 92054

PTC '87: 18-21 January 1987, Sheraton Waikiki Hotel, Honolulu

The 9th annual forum of the Pacific Telecommunications Council continues the dialog on telecommunications for Pacific development. PTC '87 will emphasize the users of telecommunications. Perspectives are being sought from a wide range of users of telecommunications, from the sophisticated, experienced to the novice and "former user," from the large business or government organization to the small business or professional user.

Papers and participation are requested from users and service providers in Asia, North and South America and Oceania that may be concerned with any aspect of the broad range of telecommunications such as telephone, data networks, electronic mail, teletex, video, broadcast, information services, local area networks, leased circuits, etc.

When submitting paper, include (1) a two page outline covering the subject and scope of your proposed paper and summary of any conclusions or findings, (2) a brief biographical statement regarding your professional background and experience. Papers should be submitted to:

PTC '87
1110 University Avenue #308
Honolulu, HI 96826
USA

The deadline for the outline and biography is 7 July 1986. First drafts are due 30 September 1986. Final manuscript will be due 28 November 1986. For further information contact the PTC office.

Coastal Zone '87 Call for Papers

The Fifth Symposium on Coastal and Ocean Management will be held 26-29 May 1987. Those interested in submitting abstracts for the following topics, please contact Mr. Orville Magoon, Chairman/P.O. Box 279/Middletown, CA 95461:

The Tsunami Warning System
The International Tsunami Information Center
Availability of Tsunami Information for various Coastlines of the World
Potential for Tsunami in Coastlines That Are Not Normally Subjected to Tsunamis

Tsunami Symposium, August-September 1987, Canada

The IUGG Tsunami Commission will hold a two-day Tsunami Symposium, sponsored by IASPEI, at Vancouver, B.C., Canada during August-September 1987, in conjunction with the IUGG General Assembly. Please send your abstracts to the following address on or before 31 December 1986 to:

Dr. T. S. Murty
Chairman, IUGG Tsunami Commission
Institute of Ocean Sciences
Department of Fisheries and Oceans
P.O. Box 6000
Sidney, B.C., V81 4B2, Canada

Geografia de Chile (Geography of Chile) Published

The Instituto Geografico Militar of Chile, as part of its efforts to foster the knowledge of geography in the country, has published in the Spanish language the first 13 volumes of the collection called "Geografia de Chile" (Geography of Chile). The complete collection will have 34 volumes, 21 are concerned with subjects such as commerce, industry, climate, energy and geomorphology. The other 13 volumes are concerned with regional subjects: one volume for each one of the 13 regions, which are dedicated to the study of the relationships between the physical and the human components of each geographical area. The latter will be published in the period 1986-1987.

PTC '86 Proceedings Published

The Proceedings of the Pacific Telecommunications Council's 8th annual conference, "Evolution of the Digital Pacific," is now available through the University of Hawaii Press, 2840 Kolowalu Street, Honolulu, Hawaii 96822.

The conference which was held early this year brought together over 500 telecommunications professionals from the Pacific area nations. The papers presented by 60 international authors covered the following topics:

EVOLUTION OF THE DIGITAL PACIFIC, overviewing the state of telecommuncations from the perspective of representatives of Asia, the Americas and the Pacific.

CURRENT TELECOMMUNICATIONS DEVELOPMENTS, discussing facilities, policy/planning, strategies, and detailing satellite and fiber optic plans and implementations.

FUTURE TELECOMMUNICATIONS DEVELOPMENTS, including new technologies, impacts, applications, covering artificial intelligence, expert systems, ISDN and new services.

TRANSITION: TRAINING/HUMAN RESOURCES, examining the status of training and human resources management in the face of rapid technological and policy changes.

Soviet-Japanese Symposium held in Khabarovsk last October

The Soviet-Japanese symposium "Geology and Geophysics of East-Asian Marginal Seas" was held in Khabarovsk, 9-15 October 1985. Professor I. K. Tuezov of the Institute of Tectonics and Geophysics in Khabarovsk was Chairman. The contents of the papers and discussions showed that recently the Soviet and Japanese scientists obtained

essentially new data on geology of marginal seas. Scientists from the Soviet Union and Japan built a number of transregional complex geological and geophysical geotraverses, reflecting the present level of knowledge on structure and geodynamics of the Earth's crust of the eastern margin of the Eurasian continent, western margin of the Pacific including the transition zone.

A number of cardinal problems on geology and geophysics of marginal seas were also discussed: a) origin of deep-sea basins of marginal seas b) nature of deep-sea processes and their relation to near-surface structures and phenomena c) structure, tectonic evolution and typification of sedimentary basins d) paleoreconstruction of western Pacific and eastern Asia structure.

Inquiries about the Symposium may be addressed to:

Professor I. K. Tuezov
Institute of Tectonics and Geophysics
Far Eastern Science Center
USSR Academy of Sciences
65 Kim Yu Chen Street
580053 Khabarovsk, USSR.

Summary of Publications from the Intergovernmental Oceanographic Commission is listed below:

IOC Consultative Group on Ocean Mapping, First Session, Monaco, 26 April 1985. Some highlights of the session were four planned regional ocean-mapping projects in Central Eastern Atlantic, Central Western Indian Ocean, Red Sea and Gulf of Aden. The Group agreed that a set of specifications for regional ocean mapping projects be prepared to "ensure that a standard form of presentation is used for all ocean mapping products published by, or on behalf of, the Commission."

Manual on Sea Level Measurement and Interpretation, 1985. This manual has been prepared by the staff of the United Kingdom Institute of Oceanographic Sciences associated with summer courses on sea-level observation and data reduction which have held under the aupices of the Intergovernmental Oceanographic Commission.

UNESCO/IOC/NBO Training Course on Tidal Observations and Data Processing, Institute of Marine Scientific and Technological Information, and Institute of Marine Technology, National Bureau of Oceanography. Tianjin, China, 27 August - 22 September 1984. The purpose of the course was to introduce the participants to basic knowledge and methods of tidal observations and data processing, including sea level measurement and data reduction, through lectures, practical training and observation.

Time Series of Ocean Measurements, Volume 2 - 1984. This publication was instituted by the Intergovernmental Oceanographic Commission (IOC) in 1983 in response to the need expressed by the research community to demonstrate the importance and usefulness of time series data to the understanding of oceanic and atmospheric processes. The historical events, such as the Tokyo Time Series Meeting in 1981, and the decisions which have contributed to the promotion of time series of ocean measurements, are outlined in Volume 1 of the series (IOC Technical Series No. 24, Unesco, 1983).

Proceedings of the International Tsunami Symposium 1985 Distributed

The Proceedings of the above Symposium, which was held last July in Canada, is available for review at ITIC. The Proceedings were edited by T. S. Murty and W. J. Rapatz with assistance from F. M. Rudka. They were published by the Institute of Ocean Sciences, Department of Fisheries and Oceans, Sidney British Columbia, Canada.

ABSTRACTS

Approximate Relationship of Intensity to Magnitude and Hypocentral Distance for Hawaiian Earthquakes

Doak C. Cox
Honolulu, Hawaii: Environmental Center, University of Hawaii
January 1985
23 pp.

This is a study of the relationship of intensity to magnitude, epicentral distance, and focal depth for Hawaiian earthquakes. Formulas relating the intensities of earthquakes to various functions of distances from the sources of the earthquakes and of their source strengths, tested by Howell and Schultz for earthquakes in the contiguous United States, are combined and modified to produce a formula relating the intensity of an earthquake in a continuous-valued equivalent of the Modified Mercalli scale to the magnitude of the earthquake and its hypocentral distance:

$$\ln(I' - 0.5) = \ln(M - 1) + a - b \ln r - cr$$

where I' = continuous-valued intensity such that $I' - 0.5 \leq I \leq I' + 0.5$

I = conventional (integer valued) MM intensity,

M = Richter magnitude

r = hypocentral distance

By applying the formula to selected records of Hawaiian earthquakes, the coefficients in it have been assigned the following values:

$$a = 0.877$$

$$b = 0.144 \text{ per ln km}$$

$$c = 0.00053 \text{ per km}$$

Recommendations are made for more thorough investigation of the relation between intensity to magnitude and hypocentral distance for Hawaiian earthquakes.

The Lanai Earthquake of February 1871

Doak C. Cox
Honolulu, Hawaii: Environmental Center, University of Hawaii
January 1985
50 pp.

From an extensive compilation of the reported effects of the large Hawaiian earthquake of February 1871, it is concluded that the earthquake occurred at 22:11 on 19 February Honolulu local time (08:42.5 on 20 February Greenwich time); that its epicenter was probably south of Lanai within 60 km of 20.8° N, 157.0° W; and that it had a Richter magnitude of 7.0 ± 0.5. Considering its probable epicentral location, it seems appropriately referred to as the Lanai earthquake.

Probable average intensities of the earthquake on the modified Mercalli scale are estimated at IX on Lanai, VII to IX on East Molokai, XI to VIII on Maui; IV to VI on Hawaii; VI to VII on Oahu; V on Kauai; and IV on Niihau.

Earthquakes, Volcanoes and Tsunamis: An Anatomy of Hazards

Karl V. Steinbrugge
New York, New York: Skandia Corporation
1986
392 pp.

The book is principally directed toward people working with earthquake insurance in the United States and Canada, but it has many applications in the financial community where there is a need to understand natural hazards and apply simple cost-effective methods.

The insurance implications of seismological terms such as "magnitude" and "intensity" are discussed as well as how this information can be applied in day-to-day operations. Hazards likely form earthquake faults are identified by diagrams and photographs.

The effect of tsunamis on Hawaii and the West Coast (including Alaska) are covered also, and the relative hazard to these areas is shown on diagrams. The relationship of volcanoes and earthquakes to plate tectonic theory is discussed, and volcanic hazards are described.

PACIFIC TSUNAMI WARNING CENTER

Joe Zebro Retires from PTWC

Joseph Zebro Jr., the senior geophysicist at the Pacific Tsunami Warning Center, retired from government service in early April with more than 31 years of service. After being with the Army in Korea, Joe obtained his degree in geophysics from Texas A & M before starting his career with the U.S. Coast & Geodetic Survey.

In the early 1960's, Joe travelled throughout the world as part of the seismological program to install a network of stations for recording earthquakes, the World Wide Standardized Seismograpah Network (WWSSN). He then worked at the Albuquerque Seismological Observatory before transferring in 1968 to Honolulu Observatory, now the Pacific Tsunami Warning Center. In addition to being the senior watchstander, Joe's major duties at PTWC have been as chief seismologist, communications specialist, and chief of the geomagnetics program for the Honolulu Observatory.

As a veteran watchstander at PTWC, Joe has seen many changes. In the late 1960's, tsunami travel times were being computed by hand, and earthquakes were located using the intersection of arcs on a globe. Messages were hand punched on teletype tape before being transmitted. The use of computers has simplified many tasks, but still Joe's skills developed to such a point that he could recognize the seismograph pattern of earthquakes form different regions and reach a preliminary evaluation of location and size before a computer location could be finalized. It was always reassuring to share a watch with Joe and hear "It's less than a 6.5 from the Solomons!" while you were still trying to get your wits together. He was seldom wrong.

After being 18 years at PTWC, Joe's experience and expertise will be sorely missed. Somewhere along the way he seems to have gotten the idea that playing golf in Albuquerque may be more soothing to the nerves than waking up to seismic alarms in the middle of the night.

ITIC and PTWC staff seriously doubt that. There is nothing more exciting than a tsunami alarm in the middle of the night. We wish Joe good times.

GEOSCOPE Instrumentation to be Installed at PTWC

Project GEOSCOPE is a global, long-period and broadband seismological network whose aim is to provide comprehensive digital seismic data for the study of the dynamics of the rupture process associated with earthquakes and for a better understanding of the composition and state of the earth's interior. Project GEOSCOPE is presently sponsored by the Institut National des Sciences de l'Univers in Paris, with scientific and technical management at the Institut de Physique du Globe de Paris.

PTWC has been selected by French scientists as one of the international GEOSCOPE sites because of the mid-oceanic location of Hawaii. Installation will be completed in April 1986, with the instrumentation located at Kipapa seismic station in central Oahu, the previous site of the Hawaii WWSSN instrumentation before relocation to PTWC. Seismic data will be telemetered to PTWC for recording purposes, but future plans are to also telemeter the data in near real-time to the Data Center in Paris.

The analysis of very long-period seismic data on a near real-time basis offers distinct operational advantages to the Tsunami Warning System of the Pacific. It has long been recognized that long-period (100-300 second) seismic waves provide an improved capability for determining the energy release of great earthquakes for which the Richter scale becomes saturated. The availability of such digital data to PTWC on a real-time basis provides a future possibility of determining the tsunamigenic potential of earthquakes in the Pacific by the rapid estimation of source mechanism and seismic moment.

Seismic Summary (1 January 1986 to Press Time)

EVENT NO.	EVENT	LOCATION	ACTION TAKEN
1986-1	Jan 15 2017Z 6.6	New Caledonia 21.3S 170.1E	Earthquake Information Bulletin issued
1986-2	Mar 06 0006Z 6.8	Caspian Sea, USSR 40.8N 52.1E	No Earthquake Bulletin issued
1986-3	Mar 24 1932Z 6.6	North Coast of Irian Java 01.9S 138.3E	No Earthquake Bulletin issued